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Cabbages and Cacti

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The purpose of this short article is iconoclastic. The subjects of the title, cabbages and cacti, have little in common, botanically, but they do serve excellently, to illustrate a little stressed and often misunderstood biological principle, and may perhaps, also, furnish a basis for the correction of a widespread and rather popular myth.

Under cabbages are included all that congeries of vegetables which are botanically related, such as all the different types and colors of cabbage itself, cauliflower, broccoli, Brussels' sprouts, kale, kohl rabi, and the rest. Scientifically, these are all classified as belonging to a single species of mustard, *Brassica oleracea*, which in its wild form, is still found growing along the western part of Europe, as an inconspicuous, "poor relation" of this opulent vegetable group.

Probably, for most people, only two of the above list of cabbage types are familiar comestibles in the course of a year. For the purpose of somewhat better identification the following brief definitions are given. The cabbage itself represents a very much enlarged 'bud', the central fibrous conical structure being the stem. The cauliflower is a thickened abnormal branching flower cluster, something like the many-headed dandelion flowers which one occasionally finds. Broccoli, the favorite of the Italian, is similar to cauliflower, but differs in being green and much less condensed. Brussels sprouts are miniature cabbages, borne as lateral buds along an elongated stem, and sold by the quart. Kale and collards are types in which the leaves are thick and succulent, sometimes very much ruffled and curled but not overlapping to form a folded head or bud, like the cabbage. In kohl rabi the leaves are disregarded in favor of the spherically thickened stem, which may be called a sort of

stem turnip; in fact, the name, kohl rabi, is perhaps a corruption of its scientific name, *canla rapa*, which means "stem turnip". It is a matter of interest that the two common types of turnips, the white and rutabaga, are both related to the cabbage group, belonging as they do to separate species of the same genus, *Brassica*, as also do the several types of Chinese cabbage.



Fully grown plant of wild cabbage, raised from seed obtained from English sources. Note that it looks like a partially developed plant of the ordinary cabbage, from which it differs in the fact that it never "heads." Courtesy of Dr. J. C. Walker, Bureau of Plant Industry and the University of Wisconsin.

However, it should be noted that the assumed relationship between the cultivated forms themselves, and with the wild type are not based on any absolutely conclusive experimental evidence. They are believed to be related because of similarity of flower structure,—they all have the simple, four-petalled, yellow flower, so common among other mustard species,—and because of the close resemblance which young

seedling plants of the different types bear to each other. It should be added that this evidence is extremely convincing to those who are really acquainted with the actual facts involved.

Another very interesting indication of the close relation between these vegetable types is furnished by the fact that all of them are subject to the same kinds of diseases, although in different degrees. Dr. J. C. Walker (University of Wisconsin and Bureau of Plant Industry) in experimental tests of resistance to cabbage "yellows" (*Jour. of Agric. Research* 37: 233-241, 1928) found that the wild type, together with varieties of broccoli and cauliflower, were highly immune, while kohlrabi and most varieties of regular cabbage were regularly susceptible, although in varying degree. The point is that the wild form does not differ in respect to "yellows" from the vegetable cabbage types, but is like some and different from others.

It is a fact, nonetheless, that all the principal types of this cabbage tribe have been known and used for the last two thousand years, and probably longer. Their production cannot be ascribed to the work of any modern "plant wizard," to use that misrepresentative and over-worked appellation of the newspaper headline writer. If their original production was the work of any particular horticulturists, apparently publicity was not so well handled in those days. No names have come down in history.

This group of plants, therefore, illustrates a principle which is often overlooked in these days of emphasis on the new discoveries of science, important as these are. With respect to these cabbage types and also with reference to most types of cultivated plants and animals, it is probably safe to say that at least eighty percent of the distinct and desirable varieties represent old forms, selected and perpetuated since before the rise of modern genetics.

We believe that in the principles of Mendelian heredity, we have found the key to incalculable progress in future breeding, and it may well be that fifty years hence, the new kinds of cultivated plants may be so extensive and revolutionary as practically to replace most of our current forms. However the progress which has been made during the last fifty years in producing important changes among cultivated plants is but a

small fraction of the differentiation which had been achieved in pre-scientific days, much of it, as with the cabbage group, in pre-historic times.

How did these old varieties come into existence? What can we guess as to the probable basis for their original selection and preservation? In the case of the cabbage group, it seems reasonable to suppose that some primitive food-gatherer, out collecting the daily supply of vitamins for her family, chanced upon a plant of this wild mustard type which made better "greens" than the common run of the species. Presumably such a better type must have been noted sometime, and preserved for later artificial propagation.

What caused the new type? The same cause that has underlain the production and discovery of most kinds of cultivated things,—chance variation, or as it is also called, spontaneous mutation. There could hardly have been any purposive hybridizing back of it, for it is only relatively recently that hybridizing has entered into the common practice of plant breeders in general. Most new varieties have arisen by unexpected and unpredicted variation, just as in the case of the commercial Boston Fern, from which hundreds of distinct new forms have appeared during the last thirty-five years.

With regard to the cactus, spineless types of which have received a great amount of newspaper publicity during the past twenty-five years, it seems to be true also that the best varieties are old, antedating any definite records of their producer. Professor Thornber, of the University of Arizona, some years ago, made a careful experimental cultural test of as many different kinds of spineless cacti as could be obtained, and found that the best and most vigorous grower in his section of Arizona was not any recently advertised commercial variety, but a Mexican Indian type which had been cultivated since before Columbus, at least.

Again contrary to general belief, he found that for cattle forage purposes, the spineless varieties which had strongly been promoted as holding great promise for the extension of cattle raising in the dry Southwest, were practically useless. The reason for this is simple. It was found that even the old Indian variety could not be grown on the open range, because the cattle would browse it so close as to kill it, if they got the

chance. Even to grow it experimentally required expensive fencing to keep the gophers and jack rabbits away, as these rodents would destroy any unprotected succulent. It is obvious, therefore, that spineless cacti cannot be economically grown if they must be protected by rabbit-proof fencing.

Paradoxically, also, Professor Thornber found that the best kinds of cactus for cattle food were the spiniest types of prickly pear and cholla, simply because neither rabbit nor even a jack-ass could eat them. The explanation of this apparently contradictory state of affairs is found in the fact that these spiny



Spiny cacti as cattle forage. The picture shows a man operating a gasoline singeing apparatus, to burn off the sharp spines, while cattle are following along, and browsing from the treated plants. Courtesy of Dr. David Griffiths, Bureau of Plant Industry.

kinds can be made available for cow fodder by an inexpensive process of singeing in which a specially constructed gasoline torch is used to burn off the protective armature. They may also be prepared by cutting off whole branches and then chopping these up in cutting machines. It was a final conclusion of the Thornber experiments that the cultivation of cacti for cattle forage deserved extension and promotion, although by itself, cactus material is an incomplete ration, and requires to be fed in conjunction with supplementary foods.

In a somewhat later experimental study, Dr. D. W. Griffith of the U. S. Department of Agriculture, carried on extensive culture of various species of possible forage cacti in Mexico. In general, his findings were in agreement with those of Professor Thornber, but the best species for Texas were still different from those found desirable in Arizona, the best spineless type being a variety developed in Italy where it is grown for fruit.

Finally, will it not be agreed, that while it is unpleasant to have rocks thrown at one's pet idols, or doubts cast at one's favorite fairy stories and myths, there are still plenty left, and there is also satisfaction, though of a different kind, in feeling the advent of a little more maturity?

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